Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
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4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

6.195 THE VALUE OF SUPPLEMENTAL METHIONINE IN PRACTICAL CHICK STARTER AND BROILER RATIONS

Matterson, L. D.; Decker, Lois; Singsen, E. P.; Kozeff, Anna; Waddell, J.; Hasbrouck, C. J.; Bird, H. R.; Menge, H.; and Runnels, T. D.
Poultry Science 32, No. 5, 817-826 (September, 1953)

Economic pressure on protein supplements for use in animal feeding is forcing large quantities of cereal protein concentrates (soybean oil meal in particular) into poultry feeds. It has been determined recently that vitamin B_{12} and antibiotics have an influence on chick growth and that the quality of the diet also has an influence upon the growth response obtained with several of the antibiotics. These considerations prompted the authors to re-examine the value of supplemental methionine in practical-type chick starter and broiler rations composed mainly of corn as a source of carbohydrate and soybean oil meal as a source of protein.

Storrs Agricultural Experiment Station, E. I. DuPont de Nemours Company, Beltsville Research Center, and the Delaware Agricultural Experiment Station cooperated in running the experiment simultaneously, all using aliquots of the same rations and chicks from the same breeding flock and hatch. The basal ration (table 1, this card, over) was a practical type ration that had been fortified with riboflavin, choline, vitamin B_{12}, niacin, and calcium pantothenate in an attempt to force methionine itself to prove its worth in a nutritionally adequate diet. The experimental plan, table 1, was a randomized block design in which synthetic DL-methionine and menhaden fish meal were the variables.

(over)

6.89 PREPARATION AND VISCOSITY OF CHITOSANS

Lusena, C. V. and Rose, R. C. (National Research Laboratories, Ottawa)
Journal of the Fisheries Research Board of Canada 10, No. 8, 521-522 (November, 1953)

Crude chitin was prepared from ground lobster carapaces by demineralizing with HCl at pH 3 or above followed by extraction with ethanol for the removal of lipids. The viscosity of the chitin obtained when measured in 45 percent HNO_3 and in 30 percent HCl showed extensive degradation even at 0° C. This finding indicates that macromolecular studies of chitin in acid would be of little value.

Chitosans, in contrast, are soluble and stable in mild solvents. To obtain a chitosan that is soluble in 0.1 M sodium acetate buffer (pH 4.6 and the most suitable solvent for intrinsic viscosity measurements) 65 percent deacetylation was required. By holding one part of chitin with 100 parts of 55 percent (w/w) KOH solution at 100° C. for 30 minutes, 65 percent deacetylation was obtained. With less alkali more time was required to obtain soluble chitosans and these were less viscous.

Demineralization treatment of the lobster shell in the process of obtaining chitin had the greatest effect on the size of the chitosan molecule. Shell that was demineralized at 5° C. and pH 3.0 gave chitosans of intrinsic viscosity 21, whereas shell that was demineralized overnight at room temperature in 5 percent HCl gave chitosans of intrinsic viscosity 4. Increasing both time and temperature increased the amount of deacetylation and reduced the size of the chitosan molecule, but even the most drastic conditions left 20 percent of the acetyl groups intact. Deacetylation under an atmosphere of nitrogen gave chitosans of a higher viscosity.

(over)

6.132 THE PROCESSING OF WHOLE MEAL

Anonymous
Meld. SSF, No. 4, 71-77 (1952)
Food Science Abstracts 25, No. 6, 643 (November, 1953)

A useful method of manufacturing whole meal is described. Herring press-cake is mixed with preconcentrated stickwater and dried. In most of the experiments reported, the stickwater was concentrated in a Laval evaporator to total solids content of about 50%, at a temperature of 115° C. at the first stage and 135° C. at the second. No appreciable loss of B vitamins occurred. The mixing of the solubles with the press-cake and the drying of the mixture in an ordinary flame drier presented no difficulties. The quality of the product was good, and the yield was increased in proportion to the amount of solids added from the stickwater.

6.14 STUDIES ON THE STORAGE OF FISHMEAL IN SEALED TINS

Venkataraman, R.; Sreenivasan, A.; and Vasavan, A. G. (Fisheries Technological Station, Kozhikode, India)
Madras Agricultural Journal XL, 1-3 (October, 1953)

Dry, sterile one-gallon cans were used as containers for fish meal. Of the total number of cans filled with the meal, one-half were simply sealed, whereas the remaining cans were filled with nitrogen before they were sealed. All cans containing the fish meal were stored at 29 to 32° C. Moisture, protein, NaCl, fat, acid value, total volatile base, and bacterial counts were determined initially and then at monthly intervals. Samples were removed from the aseptically-opened cans with the aid of a long sterile core sampler.

Total volatile base was determined by the Conway method; whereas protein, moisture, NaCl, and fat were determined by the Methods of Analysis A.O.A.C. (1945). Acid values were determined by the method described by Hilditch (1927).

The values obtained initially and at monthly intervals are shown in Table I (this card, over).

The authors concluded that nitrogen gas was slightly beneficial for the storage of fish meal in sealed tin cans. They also concluded that fish meal stored in a sealed can without nitrogen was good for at least 4 months and fair up to and including the 6th month.

(over)

6.14

TABLE I

Analytical data of fish meal

Initial values before storage:

Moisture	%	..	9·305.
Protein	%	..	41·96.
NaCl	%	..	1·513.
Fat	%	..	3·498.
Acid value		..	31·23.
T. V. B.	mg/100. g.	..	48·12.
Bacterial count per gram		..	1,256 × 10^2.

Period	Nitrogen-packed tins					Sealed tins				
	Moisture	Fat.	Acid value	T. V. B. mg. %	Bacterial counts × 10^3/g	Moisture	Fat.	Acid value	T. V. B. mg. %	Bacterial counts × 10^3/g
Month										
1st	8·79	3·34	32·82	49·0	1,410	10·72	3·8	34·32	52·12	1,410
2nd	8·36	3·5	34·6	51·21	1,454	8·42	3·23	35·3	53·21	1,609
3rd	8·27	3·62	35·2	53·02	79,380	8·34	3·09	36·47	70·0	87,260
4th	8·10	3·02	36·9	81·4	29,150	8·35	3·06	41·09	89·6	29,300
5th	8·90	2·84	56·26	83·2	81,160	8·20	3·2	50·95	98·0	59,000
6th	9·22	2·95	42·41	73·6	6,396	9·14	2·1	55·81	92·0	8,925

6.195

The findings as a result of this study where environment was the only major variable were as follows:

(1) The relative growth response to the various experimental treatments was the same at all of the stations; however, the absolute weight obtained with the birds at the different stations did vary significantly.

(2) Efficiency of feed utilization in a chick starting ration was improved significantly by the presence of supplemental methionine, whereas the improvement in growth response was variable.

(3) According to the combined data an increase in the level of fish meal from zero to 2. 5 percent markedly improved both growth and feed efficiency.

(4) Supplemental methionine improved feed efficiency even when rations containing fish meal were fed.

(5) Floor-grown chicks showed a more marked improvement in the efficiency of feed utilization on rations supplemented with methionine than did battery-grown chicks.

TABLE 1.—*Basal ration and experimental plan*

Ingredients	Percent
Yellow corn meal	54.55
Corn gluten meal	2.50
Standard wheat middlings	5.00
Soybean oil meal (50% protein)	27.98
Alfalfa meal (17% protein)	3.00
Corn distillers solubles	2.50
Bone meal	2.75
Limestone	1.00
Salt	0.25
Choline chloride (25%)	0.20
Vitamin A, 7,000 ICU/gm.	0.06
Dry Vitamin D, 4,000 U.S.P./gm.	0.037
Penicillin and vitamin B_{12} supplement	0.10
$MnSO_4$	0.025
Sulfaquinoxaline	0.015
Riboflavin supplement, 16,000 mcg./gm.	0.035
Ca pantothenate	6 gm./ton
Niacin	18 gm./ton

Experimental plan

Fish Meal* %	Methionine* #/ton			
	0	1	1½	1¾
0.0	L1	L2	L3	L4
2.5	L5	L6	L7	L8
5.0	L9	L10	L11	L12

* Fish meal and methionine substituted at the expense of corn meal and soybean meal. Adjustments made for Ca and P, protein being held constant.

6.89

A few osmotic pressure and ultracentrifuge measurements indicated extreme heterogeneity of the chitosans and the presence of large molecules or aggregates. Extraction of 3 chitosan preparations with 65 percent ethanol raised the relative viscosity of 0. 1 percent solutions from 4. 2, 13. 8, and 38. 2 to 6. 0, 17. 0, and 47. 1, respectively.

8.59 THE NITROGENOUS EXTRACTIVES FROM FRESH FISH MUSCLE. II. COMPARISON OF SEVERAL GADOID AND ELASMOBRANCH SPECIES

Shewan, J. M. (Torry Research Station, Aberdeen)
Journal of the Science of Food and Agriculture 4, No. 12, 565-568 (December, 1953)

Cod, whiting, pollack, coalfish, poor cod, poutassou, Norway pout, tusk, and hake; and skate, dogfish, and smooth hound were extracted with ethanol from one to twelve hours after catching. A few of the samples were frozen and held up to 50 days before extraction. The extracts were subjected to paper chromatography.

Results for whiting, which are typical for the other gadoid species, showed relatively large amounts of trimethylamine oxide and alanine to be present. Moderate amounts of leucine, glycine, proline, glutamic acid, serine, anserine, lysine, and histidine were indicated. Small amounts of valine, threonine, aspartic acid, β alanine, creatine, creatinine, and methylhistidine, and traces of glutathione, arginine, and amines were also present.

The elasmobranchs gave similar results with considerable amounts of betaine and moderate amounts of sarcosine also being present.

 ABSTRACTER: M. E. Stansby

6.3 FOOD FROM THE SEA

Anonymous
Chemical and Engineering News 32, No. 2, 134 (January 11, 1954)

Conventional belief is that fishery resources of the world are in serious danger of depletion, when actually the total removal of fish from the ocean is statistically negligible, says consultant Harden F. Taylor. Ocean has 2.5 times land area, contains by far the greater part of the chemical fertilizers of the earth, receives 71% of the sunshine, and appears to produce more living matter per acre than the land. Yet man gets less than 1% of his food either by weight or in calories from the sea. All the rest of his food comes from the soil.

Total production by world's fisheries is not related to the abundance or scarcity of fish in the water but is determined solely by market demand. In the United States, Taylor says total quantity and dollar value of fish produced varies from year to year as the result of purely economic factors. Total fish output is obtained at much lower cost and sold by fishermen at less than one third the price received by farmers for competing protein foods of animal origin on a comparable basis. In addition, fish prices have for many years moved downward in relation to prices of other commodities and other foods.

Anxiety generated by the increasing population and by prospective further increases as medical practices cause the death rate to diminish is stimulating the search for new additional sources of food -- such as algae, yeasts, and oceanic plankton. In all these cases, it is assumed that the botanist and biochemist need only find something that can provide the necessary biochemical nutrients in large quantities, with little regard for the willingness of consumers to accept them.

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6.193 THE VALUE OF FISH SOLUBLES AND A VITAMIN B_{12}-ANTIBIOTIC SUPPLEMENT IN CHICKEN AND TURKEY MASH MIXTURES CONTAINING TEN PERCENT MEAT SCRAPS

Halbrook, E. R.; Beeckler, A. F.; and Smith, Ervin P. (Department of Poultry Industry, Montana State College, Bozeman)
Poultry Science 32, No. 6, 1058-1068 (November, 1953)

During the first 12 weeks of life both the growth rate and the feed efficiency of New Hampshire and Silver Cornish White Leghorn chicks were favorably influenced to a slight degree by the feeding of 3 percent condensed fish solubles in mash mixtures containing 10 percent meat scraps. During the same period of time and on the same diet the growth rate, feed efficiency, and livability of Broad Breasted Bronze turkey poults was stimulated considerably. Both the two breeds of chicks and the turkey poults showed improved weight at 24 weeks of age. Mortality, however, was higher and feed efficiency was lower in the groups of chicks and poults receiving the fish solubles during the 12- to 24-week feeding period.

Except for the White Leghorn chicks,where a definite improvement in market grade was observed, the ducks and poults receiving the fish solubles did not receive any higher market grade as broilers and turkeys than the chicks and poults that received the basal ration.

When fish solubles were continued in the ration fed during the first 10 months of the laying period the egg production, feed efficiency, and mortality of S. C. White Leghorn hens, but not New Hampshire hens, were favorably influenced. Body weight and egg size were improved in both breeds. No improvement was found in the hatchability of eggs from S. C. White Leghorn and New Hampshire hens grown and fed as breeders on rations containing fish solubles.

(over)

 ABSTRACTER: Martin Heerdt

7.69 UNIDENTIFIED FACTORS IN POULTRY NUTRITION. I. DEVELOPMENT OF CHICK ASSAY

Lillie, Robert J.; Sizemore, J. R.; and Bird, H. R. (U.S.D.A., Beltsville, Maryland)
Poultry Science 32, No. 5, 855-862 (September, 1953)

The authors attempted to develop a biological assay method for determining and measuring an unidentified growth factor in feeds. Day-old New Hampshire (N.H.) chicks and day-old Rhode Island Red (R.I.R.) chicks were each divided into 3 uniform groups on the basis of hatching weights. All of these birds were supplied with feed and water ad libitum and maintained on wood shavings in a multiple-unit electric brooder house. Group No. 1 of each breed received standard starter diet R.D. 1 containing 4 percent fish meal (table 1, this card, over). Group No. 2 of each breed received diet R.D. 1 minus the fish meal and group No. 3 received diet R.D. 1 minus the fish meal but with 0.2 percent crude vitamin B_{12} supplement.

According to table 2 (omitted), the N.H. males, N.H. females, R.I.R. males, and R.I.R. females grown on diet R.D. 1 with fish meal weighed at 6 weeks of age 98, 17, 50, and 6 grams more than similar birds grown on diet R.D. 1 without fish meal. The growth data showed no advantage from incorporating 0.2 percent crude vitamin B_{12} in diet R.D. 1 without fish meal.

Day-old Beltsville Small White turkey poults also were included in the study. These were divided on the basis of body weight into uniform groups of 20 poults each. All were supplied with food and water ad libitum and maintained on raised screen floors in electrically-heated batteries. The poults received one of the following: basal diet G (table 1), diet G plus 4 percent fish solubles, diet G plus 8 percent wood yeast, diet G plus 6 percent whey product, or diet G plus 5 percent meat and bone scrap. The growth data obtained at the end of 4 weeks with turkey poults (table 3, omitted) showed no definite and consistent response, and no further experiments were tried with turkeys.

(over)

 ABSTRACTER: Martin Heerdt

6.193 (Cross Reference: 6.15)

It is concluded that condensed fish solubles contain either a new nutritional factor required by poults and chicks for maximum growth or the 10 percent of meat scraps is insufficient for supplying the vitamin B_{12} requirements for maximum growth.

When poultry mashes containing as much as 10 percent of meat scraps were supplemented with vitamin B_{12} and an antibiotic the value of the supplements was limited to increased growth and improved livability during the early growing period of the chicks and poults. The primary use of these two supplements, therefore, would be in the production of broilers and turkeys for market. Egg production and hatchability were not improved by supplementing the poultry mashes containing as much as 10 percent of meat scraps with vitamin B_{12} and an antibiotic. A trend toward increased mortality during the late growing period was somewhat evident where the use of antibiotics had improved livability during the early growing period.

7.69 (Cross Reference: 6.193)

With the knowledge gained in the foregoing experiments, 4-week assays of various feed supplements were made using purebred male New Hampshire chicks or male chicks from a cross of New Hampshire males and Silver Cornish females distributed into uniform lots of 10 each on the basis of body weight. The basal diets fed were chick diet G and, eventually, chick diet G_1, both of which are shown in table 1. The effect of modifying basal diet G by the inclusion of various essential nutrients is shown in table 4; fish products, yeast, and whey in table 5 (omitted); bacterial cultures in table 6 (omitted); and microbiological cultures in table 7 (omitted). These assays showed the following substances to be effective in promoting growth: fish meal, fish solubles, N. F. 2 liver fraction, meat and bone scraps, wood yeast, brewers' yeast, dried cells of Torula utilis, Hansenula suaveolens, and Bacillus subtilis, dried sewage sludge, hatchery residues, and dried poultry offal. Dried whey product, orotic acid, a liver fraction called Biopar "C" and dried cells of Streptomyces olivaceus had little effect.

TABLE 1.—*Composition of basal diets*

	R.D. 1[1]	G[2]	G_1[2]
	%	%	%
Ground corn	60.85	59.8	57.85
Alfalfa meal	5.0	5.0	5.0
Soybean meal	27.0	31.0	32.0
Fish meal	4.0	—	—
Butyl fermentation solubles[3]	2.0	0.6	0.6
Limestone flour	1.0	1.3	1.0
Steamed bonemeal	1.0	1.75	3.0
Salt mixed	0.5	0.5	0.5
D-activated animal sterol	0.05	0.05	0.05
	100.0	100.0	100.0

[1] The following supplements were incorporated in terms of mg. per 100 grams diet: 3-nitro, 4-hydroxyphenyl arsonic acid 5; penicillin 10; streptomycin base 4; folic acid 0.2; vitamin B_{12} concentrate (12.5 mg./lb.) 200, and ascorbic acid 100.

[2] Same as footnote 1 except that aureomycin (2 mg./100 gms.) was substituted for streptomycin base.

[3] Same as footnote 2 except that ascorbic acid was omitted.

[4] 500 mcg. riboflavin per gram.

[5] 96% NaCl and 4% $MnSO_4$.

TABLE 4.—*Effect of modification of basal diet G upon the growth performance of chicks*

Group	Chick diet	4 weeks grams
	Experiment 391 (New Hampshires)	
	Basal G	294
1	As 1 plus 4% fish meal	328
2	As 1 minus F, C, Ar[1]	308
3	As 3 plus 4% fish meal	300
4	Experiment 366 (sex-linked cross)	
	Basal G	289
1	As 1 plus 4% fish solubles	329
2	As 1 plus 40 mcg. B_{12}/kg.	302
3	As 3 plus 4% fish solubles	329
4	As 1 minus Au, Ar, C, F, M[1]	279
5	As 5 plus 4% fish solubles	306
6	As 1 minus M[1]	318
7	As 7 plus 4% fish solubles	329
8	Experiment 369 (sex-linked cross)	
	Basal G	289
1	As 1 plus 4% fish solubles	337
2	As 1 plus 4 f.s. plus 8% whey solids, w.s.	354
3	As 1 plus 40 mcg. B_{12}	302
4	As 1 plus vitamins[2]	369
5	As 3 plus vitamins[2]	306
6	As 1 minus F, C, M[1]	336
7	As 6 plus 4% fish solubles	382
8	As 3 minus F, C, M[1]	

[1] F = folic acid, C = ascorbic acid, Ar = arsonic acid, Au = Aureomycin, M = methionine.

[2] f.s. = fish solubles, w.y. = wood yeast, w.p. = whey product.

[3] mg. per kg.: diet: thiamine, 2.4; riboflavin, 4.8; calcium pantothenate, 12; choline, 1,200; niacin, 30; pyridoxin, 3.6; biotin, 0.12; p-aminobenzoic acid, 1.2; folic acid, 2.

8.59 (Cross Reference: 8.51)

6.3

Taylor feels none of these substances will be accepted as food in any considerable quantity. Oceanic plankton is not only too highly dispersed in sea water to be collected economically but is unsuitable for human food. It would be as logical to expect people to eat grasshoppers, locusts, and ants as to eat oceanic plankton. If people hold in such low esteem the fishes of the herring family that 6.5 billion pounds of it sell for 1.5 cents per pound at the pier, with all its excellent food values, what reason is there to believe that they will hold in any higher esteem or pay any higher price for torula yeast or Chlorella?

6.89 GLUCOSAMINE FROM LOBSTER SHELLS

Hoogland, P. L. and Hiltz, R. St. C. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 57, 6-8 (November 1953)

Since Dr. Quastel at Montreal demonstrated a 10-fold increase in the survival time of mice with certain tumors when they received glucosamine daily, d-glucosamine hydrochloride has become very important.

Glucosamine may be prepared from lobster shells by softening the shells with dilute HCl to remove $CaCO_3$; dissolving the softened shell in hot, concentrated HCL; and evaporating the solvent. The remaining material consists of a mass of crude glucosamine hydrochloride crystals. Glucosamine of relatively good quality sells at a price of $65.00 a pound.

Production of glucosamine hydrochloride by the existing method was reinvestigated. Distillation of HCl was carried out in vacuo at a fairly low temperature in place of open evaporation at a high temperature, and the recovered HCl was used again. A yield of about 9 percent of the weight of the crude shells was obtained with both 3- and 9-pound batches of shell. Shell that had been on the wharf for 3 weeks during June and allowed to become moldy gave a 6 percent yield. Cold storage of the shell is recommended.

The quantities and the cost of the chemicals used to produce 1 pound of pure glucosamine hydrochloride in large-scale experiments with about a 9 percent yield are shown in tabular form (this card, over). The chemicals used cost about $1.50, labor about $7.00, overhead and depreciation about $1.00, and raw material almost nothing per pound of produced d-glucosamine hydrochloride of better than 99.0 percent purity. The results of a typical batch analysis are also listed in tabular form

(over)

 ABSTRACTER: Martin Heerdt

6.190 TURKEY HATCHABILITY AND EGG PRODUCTION

Couch, J. R. and Atkinson, R. L.
Feedstuffs 25, No. 51, 30 (December 19, 1953)

A breeding flock consisting of sixty young broadbreasted bronze hens distributed at random in 4 small houses 14 x 14 feet in size was used to check the effect of four different diets on egg production and hatchability. The hens were mated with broadbreasted bronze toms that were rotated between houses each week and replaced with new toms every four weeks. The basal diet fed was composed of 30 percent soybean oil meal, 30 percent ground yellow corn, 29 percent ground milo, 5 percent dehydrated alfalfa meal, 3 percent phosphate, 2 1/2 percent oyster shell flour, 1/2 percent salt, and the following minerals and vitamins: $MnSO_4$ 120 mg./lb., vitamin A 4000 I.U./lb., vitamin D 1200 I.C.U./lb., riboflavin 2 mg./lb., calcium pantothenate 5 mg./lb., niacin 20 mg./lb., choline chloride 400 mg./lb., vitamin B_{12} 6γ/lb., penicillin 1 mg./lb., bacitracin 2 mg./lb., and aureomycin 2 mg./lb.

Group I hens received only the basal diet. Group II hens received the basal diet supplemented with 5 percent fish meal. Group III hens received the basal diet supplemented with 5 percent distillers' dried solubles. Group IV received the basal diet supplemented with 5 percent fish meal and 5 percent distillers' dried solubles. All supplementations were made at the expense of soybean oil meal and milo in such a way that the protein level remained the same for all groups.

The fertility of the eggs from all four groups averaged about 80 percent during the 20-week experimental period. Eggs from the two groups receiving fish meal were of about 5 percent higher fertility than eggs from the two groups not receiving fish.

(over)

 ABSTRACTER: Martin Heerdt

6.132 THE GRINDING OF HERRING MEAL

Anonymous
Meld. SSF, No. 2, 28-34 (1952)
Food Science Abstracts 25, No. 6, 643 (November, 1953)

Herring meal composed of particles of suitable and even size has a better appearance than very uneven meal. The view that the meal should be as finely ground as possible is not believed to be shared by users of the meal. The appearance of a meal is spoilt by the presence of even a few particles which are much too large. Such particles can be removed by a single sieving. Means of incorporating a sieving system in the grinding plant are suggested. Open and closed grinding, and horizontal and (American) vertical mills, are compared.

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6.137 THE SEPARATION OF GLYCERIDE CONCENTRATES FROM NATURAL FATS BY CRYSTALLIZATION FROM SOLVENTS

Cama, J. S.; Chakrabarty, M. M.; Hilditch, T. P.; and Meara, M. L.
Journal of the Science of Food and Agriculture 4, No. 7, 321-328 (July, 1953)

The degree of segregation of different categories of saturated and unsaturated glycerides by the systematic crystallization of fats and fatty oils from solvents was tested. Artificial fat mixtures of approximately known composition prepared from concentrates of various types of mixed glycerides were taken through the procedure. The results were generally accordant with the proportions of the different glyceride categories known to be present.

The simple mixture of oleodistearin and oleolinoleins was separated accurately without difficulty by means of three crystallizations: the mixture was crystallized from acetone (10 ml. per g.) at -40°, the deposited solids were again crystallized similarly at -40°, and the solids then deposited crystallized from acetone at -20°.

Comparison of observed and calculated proportions of component glycerides in each of the artificial fat mixtures A, B and C, and in the mixture of equal parts of poppy-seed and sesame oil is made in table VII. The accordance between observed and calculated proportions is reasonably good except for the disaturated and the monosaturated glycerides in mixture B and the monosaturated glycerides in mixture C. In spite of the generally good accordance, the authors are not convinced that the procedure of preparing artificial fat mixtures of approximately known composition is altogether satisfactory as a method of testing the accuracy of the crystallization technique as applied to natural fats; the preparation and storage of the unsaturated glyceride concentrates needed to prepare the artificial fat mixtures involve the risk of oxidative changes.

(over)

 ABSTRACTER: D. T. Miyauchi

6.137

The authors believe a better method lies in comparing the proportions of trisaturated glycerides found in a number of fats by the crystallization method with those found in the same fats by the chemical process of oxidation to acidic derivatives of all glycerides containing unsaturated groups by potassium permanganate in acetone solution. The data presented show that:

"1. In 8 vegetable and 6 animal (body or milk) fats in which the content of fully saturated glycerides has been determined by different workers (a) by isolation after removal of all unsaturated glycerides by permanganate acetone oxidation and (b) by the method of systematic crystallization, the results by either procedure are substantially identical.

2. The contents of simple triglycerides (when present) of unsaturated acids such as oleic, linoleic, linolenic, elaeostearic or ricinoleic recorded by the crystallization procedure, arranged in relation to the proportion of such acid in the total acids of the fat concerned, form a regular sequence which is the same as that for trisaturated glycerides in relation to the proportion of saturated acids in the total acids of the fat."

Table VII

Comparison of observed and calculated proportions of glyceride categories

	Fat mixture A		Fat mixture B		Fat mixture C		Poppy/sesame oil mixture	
	Found	Calc.	Found	Calc.	Found	Calc.	Found	Calc.
Trisaturated	17	17	5	5	—	—	—	—
Disaturated	47	47	41	34	1	5	3	3
Monosaturated	36	36	52	59	50	42	41	43
Triunsaturated	—	—	1	2	49	53	56	54

6.89

(this card, below). The same purity and yield could be obtained on an industrial scale, whereas it is believed that the cost of production could be cut in half.

Analysis of d-glucosamine hydrochloride

Batch No.	Moisture Content	Ash Content	Nitrogen Content	Optical Rotation	Purity
DK 1	0.13%	0.034%	6.41%	71.5°	99.3%

Amounts and cost of chemicals used to produce one pound of finished product.

Chemical	Description	Amount	Cost
Hydrochloric acid 37%.....	Chem. pure	13.1 lb.	$1.31
Charcoal.....	Darco G 60	0.18 lb.	$0.11
Filter aid.....	Supercel	0.12 lb.	$0.01
Alcohol 95%.....	Duty free	0.07 gal.	$0.10

6.190

Hatchability of the eggs from all four groups averaged about 82 percent (excellent) during the first 8 weeks of the experimental period, but became unsatisfactory after the 8th week and had dropped to about 25 percent by the end of the 14th week. The eggs from all four of the different groups maintained about the same percent hatchability, and all declined in hatchability after the 8th week. This decline in hatchability is a common occurrence. It is believed that the lack of an unidentified hatchability factor is responsible for this decline.

8.64 NUTRITIVE VALUE OF CANNED FOODS

Teply, L. J.; Derse, P. H.; Krieger, C. H.; and Elvehjem, C. A.
Journal of Agricultural and Food Chemistry 1, No. 20, 1204-1207 (December 23, 1953)

Vitamin assays and proximate analyses were carried out on canned food products in order to obtain values that were not available from the literature or to bring the number of samples studied in the National Canners Association-Can Manufacturers Institute program in line with geographical distribution and volume of production.

One to ten samples of each of 48 products were assayed for vitamin B_6, folic acid, thiamine, riboflavin, and niacin on a basis of total edible contents. The results of these assays for the fishery products included in the study are shown below.

Vitamin B_6 and Folic Acid in Canned Foods

Product	No. of Samples	Vitamin B_6, Mg./100 G. Range	Vitamin B_6, Mg./100 G. Av.	Folic Acid, Mg./100 G. Range	Folic Acid, Mg./100 G. Av.
Clams	5	0.030 -0.133	0.083	0.0009-0.0036	0.0020
Crab	1	...	0.364	...	0.0004
Oysters	3	0.010 -0.090	0.037	0.0016-0.0300	0.0113
Shrimp	5	0.0148-0.372	0.111	0.0009-0.0044	0.0018
Tuna	4	0.45 -0.92	0.67	0.0006-0.0032	0.0018

(over)

 ABSTRACTER: Roy C. Stevens

8.42 IODINE IN FISH OIL

Swain, Lyle A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 97, 11 (December, 1953)

The "iodine value" is one of the characteristics commonly determined in a chemical analysis of a fish oil. It is a measure of the ability of an oil to react with oxygen and become rancid or to become dry and form a hard film such as the oils commonly used in paints and varnishes. The iodine value is a measure of the quantity of iodine with which the oil can combine under certain conditions. The iodine value of an oil is not a measure of the amount of iodine present in the oil.

Fish oils and marine products in general, however, do contain appreciable amounts of iodine. A publication of the Chilean Iodine Educational Bureau (1952) entitled, "Iodine Content of Food" shows a fish oil that contains 4,630 parts of iodine per billion parts of oil. For comparison, the iodine content of milk, fruit, and marine fish as taken from the Chilean publication are also reprinted below in tabular form. To make the values for milk, fruit, and fish comparable in form to fish oil, they have been converted to a water-free basis. Marine fish is the only food that approaches fish oil in iodine content.

Food	Water content % (approx.)	Iodine content parts per 1,000,000,000 normal	Iodine content parts per 1,000,000,000 water-free
Fish oil	0	4630	4630
Milk	87	47	360
Fruit	80	18	90
Marine fish	75	832	3230

 ABSTRACTER: Martin Heerdt

8.6179 LIVER OF WHALES AS RAW MATERIAL FOR PRODUCTION OF VITAMIN A

Bukin, V. N. and Skorobogatova, E. P.
Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik 1, 207-215 (1951)
Chemical Abstracts 47, No. 11, 5630 (1953)

The highest vitamin level is found in the liver fat of sperm whale: 400,000 I.U./g., followed by fin-whale (200,000 I.U./g.). Smaller species carry much lower levels of the vitamin (15-25% of the above figures). The ordinary salt method of rendering the whale liver causes vitamin losses of about 15%, although it is simplest to apply under the field conditions. Usually smaller specimens have lower content of vitamin A in the liver than do the large specimens (on relative size basis).

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8.59 STEAM-VOLATILE FATTY ACIDS FROM A MARINE TUBE WORM

Idler, D. R. and Fagerlund, U. H. M. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 97, 6-8 (December, 1953)

A 2-kilogram quantity of fresh tube worms Eudistylia vancouveri was ground in water, the protein was precipitated with tungstic acid, and a clear solution was obtained by filtration with celite. After adding $MgSO_4$ to the filtrate until a concentration of 25 percent was reached, the filtrate was distilled until $MgSO_4$ began to crystallize out of the boiling solution.

The distillate was neutralized with NaOH, concentrated to 300 ml., and neutral compounds (including n-octanol) were extracted with ether. The aqueous phase, after acidification with 10 N H_2SO_4 and the addition of $MgSO_4$ to 25 percent concentration, was redistilled and the steam-volatile fatty acids were collected. After neutralizing the distillate with NaOH and concentrating to 5 ml., excess potassium acid sulfate was added to liberate free fatty acids from their sodium salts.

Formic acid was determined by distilling aliquots of the potassium acid sulfate solution with and without mercuric oxide a compound that destroys formic acid.

For the determination of acetic and propionic acids, another aliquot was distilled in the presence of mercuric oxide. The distillate, after being neutralized with NaOH and dried in vacuum, was treated with 10 N H_2SO_4 and the fatty acids were extracted with ether. The ether was then dried and any sulfuric acid present was removed by passage through dry celite. The remaining mixture of fatty acids when separated quantitatively on a methanol-water-chloroform partition chromatogram was found to be composed of 65 percent acetic acid and 35 percent propionic acid (figure 1, omitted).

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 ABSTRACTER: Martin Heerdt

B VITAMINS IN CANNED SEAFOODS

VITAMIN A IN WHALE LIVER

IODINE IN FISH OIL

FATTY ACIDS FROM MARINE TUBE WORM

8.6179 (Cross Reference: 1.95)

8.59

A chromatogram of a known mixture consisting of 65 percent acetic acid and 35 percent propionic acid was also prepared and, when examined, was found to correspond exactly with the chromatogram of the unknown mixture. Finally, p-toluidides of acetic (m.p. 153°C.) and propionic (m.p. 123°C.) acids from the tube worm were prepared. Neither melting point was depressed by the corresponding synthetic p-toluidide.

Octanoic acid was extracted from the potassium acid sulfate solution with low boiling petroleum ether and chromatographed on celite with a methanol:petroleum ether solvent system. Octanoic acid from the tube worm corresponded exactly to n-octanoic acid which was chromatographed on the same column after the tube worm acid had been eluted (figure 2, omitted). Octanoic acids from the two different sources also behaved identically on a butanol:1.5 N ammonium hydroxide paper chromatogram.

The steam-volatile acid composition of the tube worm is shown in tabular form below.

Steam-volatile fatty acids of *Eudistylia vancouveri*.

Acids	Concentration in worm (mg./kg.)	Percent of total volatile acids
Formic	27.0	11.5
Acetic	133.0	56.5
Propionic	71.5	30.5
Octanoic	3.4	1.5
Total	234.9	100

8.64 (Cross Reference: 8.50)

Thiamine, Riboflavin, and Niacin in Canned Foods[a]

Product	Thiamin, Mg./100 G.		Riboflavin, Mg./100 G.		Niacin, Mg./100 G.	
	Range	Av.	Range	Av.	Range	Av.
Clams	0.002-0.021 (5)	0.009	0.052-0.168 (5)	0.093	0.30-2.00 (5)	0.95
Crab	0.001 (1)	0.001	0.144 (1)	0.144	2.48 (1)	2.48
Oysters	0.012-0.033 (3)	0.020	0.125-0.330 (3)	0.20	0.56-1.64 (3)	1.02
Tuna	0.010-0.036 (4)	0.019	0.070-0.120 (4)	0.089	10.4-15.4 (4)	13.6

a Figures in parentheses indicate number of samples assayed.

Proximate analyses of 15 products, in general, checked with values previously reported. Clams, crab and oysters were included in this study and the values found are given below.

Proximate Analysis of Canned Foods
(Average values, %)

Product	No. of Samples	Solids	Ether Extract	Ash	Crude Fiber	Protein	Carbohydrate	Calories/100 Grams
Clams	5	15.4	0.40	2.27	0.04	9.9	2.8	54
Crab	1	23.9	0.32	2.80	0.05	18.7	2.0	86
Oysters	3	16.5	1.58	0.72	0.12	8.8	5.2	70

7.30 APPLICATION OF PSYCHOMETRICS TO FOOD TESTING

Anonymous
Food Processing 15, No. 2, 32-33 (February, 1954)

The food processor who considers production of a new or changed product must realize that it is the consumer who will finally determine the soundness of his judgment. Because of the many tangible and intangible factors involved in consumer acceptance, the processor must use every possible means for judging a product before approving production and marketing.

Quality, uniformity, and stability can be determined by physical and chemical tests in the laboratory. To evaluate those properties for which laboratory tests have not been developed, such as organoleptic or psychological, management can turn to the consensus of trained or selected panels and to consumer sampling and surveys.

It has been demonstrated that the psychology of samplers as well as of prospective consumers must be considered just as much as the impact of a product on the senses of taste, smell, sight and touch. The approach of psychometrics then is to place the major emphasis upon the consumer's reaction to a product rather than upon the product itself. It goes beyond the simple sensory responses of taste, appearance, and texture, and includes such intangibles as experience, habit, and environment.

In evaluating the prospects for the success of a product, quality may often be secondary to consumer wants and expectations. For example, famine stricken orientals are reported to have gone hungry rather than to accept the surplus wheat offered them when what they wanted was rice.

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 ABSTRACTER: Roy C. Stevens

6.137 THE FRACTIONATION OF SEAL OIL BY MEANS OF FURFURAL

Dugal, L. C. (Gaspe Fisheries Experiment Station, Grande Riviere, P.Q.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 57, 3-4 (November, 1953)

The film that results when fish oils are used in paint or varnish always remains soft and tacky because these oils contain a large proportion of saturated fatty acids. Much research effort has been spent over the years to find means of removing these saturated fatty acids so as to leave in the oil only the unsaturated fatty acids which will yield a completely dry paint film.

Solvent fractionation of the oil is one method of removing the unsaturated fatty acids. The process is based on those solvents that have a special affinity for a certain group of fatty acids. The unsaturated fatty acids, for example, are more soluble in furfural, liquid propane, or methyl alcohol than are the saturated fatty acids. However, as the fatty acids are not free but are combined in the form of triglycerides, the separation is never clear-cut.

Furfural was selected for use in this study because of its ease of manipulation in the laboratory. The seal oil was added to the furfural, heated with agitation until completely miscible (150° F. or 65° C.), and allowed to stand and cool until the solution separated out into an upper and a lower layer. The two layers were then separated from each other and the solvent was removed from each layer by distillation at reduced pressure. The fraction present in the lower or furfural layer, called the extract, had an iodine value higher than the iodine value of the original oil; whereas the fraction present in the upper or oily layer, called the raffinate, had an iodine value lower than the iodine value of the original oil.

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 ABSTRACTER: Martin Heerdt

6.72 COD LIVER OIL PREPARATIONS IN DERMATOSES

Anonymous
Drug and Cosmetic Industry 74, No. 1, 95 (January, 1954)

In a report on the dermatologic value of cod liver oil ointment and cod liver oil lotion, the view has been expressed that vitamins A and D are probably involved in skin metabolism. This opinion is based on the results of a series of tests in which 351 patients received topical applications of cod liver oil ointment and cod liver oil lotion. A favorable response was achieved in 306 cases. (87.2 percent) and a poor response was obtained in the case of 45 children and adults (12.8 percent).

In a series of 215 patients with contact dermatitis, a beneficial effect was obtained with 208 infants and children. There was no response in seven infants and children. In 48 cases of stasis dermatitis with or without ulcers and in eight patients with decubitus ulcers, improvement was noted in 34 adults and failures in 20 adults. Temporary improvement was observed in 47 cases out of 65 with subacute or chronic neurodermatitis. In 17 patients with surgical wounds, local application of cod liver oil ointment resulted in striking healing and epithelization of the granulation tissues in all cases.

On the basis of these results it is concluded that cod liver oil ointment and cod liver oil lotion are good topical applications for the treatment of a variety of skin disorders and wounds. They are considered to be safe, harmless, soothing, and relatively antibacterial.

 ABSTRACTER: Roy C. Stevens

6.3 THE THERMAL DEGRADATION OF CARRAGEENIN

Masson, C. R. and O'Neil, A. N.
Chemistry & Industry, No. 1, 13 (January 2, 1954)

The thermal degradation of carrageenin, a water-soluble polysaccharide derived from the seaweed Chondrus crispus, has been studied in aqueous solution at pH 7.0. The reaction has been followed by measurement of viscosity, titratable end-groups and osmotic molecular weight. Kinetic analysis indicates the occurrence of two reactions: (a) an initial rapid degradation which takes place at relatively low temperatures and (b) a first-order random degradation which becomes important at temperatures above 60° C. The second reaction has a rate constant given by

$$k = 2.95 \times 10^{13} \; e^{-29,500/RT} \; \text{hr.}^{-1}$$

The sulphate content of the polyelectrolyte increases in the early stages of the reaction, indicating the removal of non-sulphated sugar residues. The results are discussed from the point of view of the structure of carrageenin.

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7.80

A product that delights may be rejected in a test because it may be regarded as too highly priced when improperly compared with another item that consumers unconsciously associate with it. Such hazards can often be avoided by the psychometric approach. "Prejudice and judgment are just as important as pleasant sensory experiences in determining whether and how often the consumer will select your new item from among the thousands of products which competitively bid for space in her market basket."

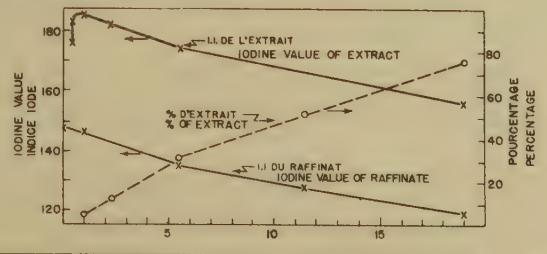
6.137

The two primary factors that influence the properties of the fractions obtained are (1) the proportion of solvent to oil and (2) the temperature at which the heated and agitated solution of solvent and oil is allowed to stand and separate into two layers. In this study the ratios of solvent to oil were varied between 1 to 3 and 24 to 1. Beyond these ratios the furfural and oil was always completely miscible at room temperature. The original seal oil after having been refined with NaOH then with fuller's earth had an iodine value of 148.

Figure 1 (below) contains a graphic presentation of the results obtained. When the ratio of furfural to oil was low, the iodine value of the extract was high. By using a furfural-to-oil ratio of 1 to 1, the iodine value could be increased from 148 for the oil to 183 for the extract. Increasing the furfural-to-oil ratio decreased the iodine value of the extract and increased the yield of the extract; thus the iodine value is inversely proportional to the yield of the extract.

From the standpoint of economy, it has been found preferable to try for the highest possible yield of an oil that has a medium iodine value with improved drying properties than to try for an unusually high iodine value oil.

The study will be continued. Specialized tests will be used to determined the physical properties and the value of the fractions in specific fields.



3.338 CAN WASHER WITH NO INTERNAL MOVING PARTS

Anonymous
Food Processing 15, No. 2, 78-79 (February, 1954)

Prior to the installation of its new can washing equipment a Terminal Island, California tuna cannery experienced a five percent rejection at labeling. Considering that the plant produces up to 700,000 cans daily this is a sizable figure.

This rejection was due to the presence of fish and soybean oil residues adhering to the filled cans that caused the labels either not to stick or to become oil soaked and unsightly. The company's old method of washing the cans by dipping them in wash water and detergents was ineffective. Yet it required 8 washing machines, 16 motors, and about 8 workers to do the washing job.

The company's engineers have now designed a single, high-capacity washer to take care of all eight canning lines at once. Cans coming off the closing lines travel by conveyor to a triple-compartmented 22' x 16' x 12' high steel can washer. A sump is installed in each compartment. The first compartment holds prewash water; the second, wash water and detergents; and the third, rinse. The water in each is held at 190° F.

Each sump is separated from the others by baffles, and each is agitated by a 40-h.p. motor driving a pump having a capacity of 1000 gallons per minute. The cans enter the prewash section in a verticle position via one of 16 gravity runways having a slope of 3/4 inch to the foot. As the cans pass along each runway a series of triple-headed high-pressure jet nozzles deliver successive sprays of prewash, wash, and rinse water at 45 pounds per square inch. Five nozzle assemblies bathe the prewash section of the unit; nine cover the washing section; and seven deliver rinse water.

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 ABSTRACTER: Roy C. Stevens

3.33 NEW METHOD OF SARDINE PROCESSING INTRODUCED IN MAINE CANNERY

Anonymous
Fishing Gazette 71, No. 1, 50 (January, 1954)

A new method of packing instituted by a Port Clyde, Maine sardine processor is claimed to produce a better product while, at the same time, it eliminates the cumbersome flakes and racks normally used and thus reduces the help required.

In the new process the herring go directly from the brine tanks to the women who pack. To this point the fish have been processed in no way. Once packed, the cans go onto trays which then are stacked on wheeled carts holding 50 trays each. When loaded, the trays are locked in place and the carts are wheeled into a steam chamber.

The fish remain in the steam room for a period of 15 minutes and then come out, thoroughly cooked, according to the originator of the process. Coming out of the steam chamber the cans are full of boiling water and juices from the fish. The carts are so constructed that the load can be tipped upside down, thus permitting all the liquids to drain off, leaving the fish dry. After half and hour in a drying cabinet the fish move along to the oiling and sealing machines.

This method was used by the company in packing 80,000 cases last year.

 ABSTRACTER: Roy C. Stevens

3.33 "ECONOMY" TUNA PACKING PROCESS IS UNVEILED

Anonymous
Pacific Fisherman 52, No. 3, 63 (February, 1954)

The new process packs tuna without precooking, and instead substitutes a centrifugal extraction step. The process, in brief, is as follows:

(1) The head of the tuna is removed by a compressed air-operated guillotine knife. The fish is then placed between spring-loaded, curved guides that carry it into four rotating circular knives. These knives, which set at right angles to each other, quarter the tuna. The tail, backbone and viscera are removed by hand as the fish is conveyed to a 10-station cleaning table where the dark meat is removed from the quarters.

(2) The cleaned quarters are pushed into the skinner, where a light pressure is exerted on them by a series of rubber rollers as the conveyor takes them over a horizontal endless knife traveling at right angles to the conveyor belt. The height of the knife may be adjusted to take any depth of cut desired. Any remaining skin, fins, and the dark meat from the skin side of the quarters are removed at a 10-station table before the quarters are washed.

(3) The fillets are placed in a head box, from which a plunger pushes them into the pockets of the centrifugal extractor. As the new load enters the pocket, the extracted fillets of the previous cycle are pushed out. There are 17 of these pockets. The loaded extractor is allowed to rotate at top speed for 20 seconds, although it can be regulated as to time and speed of rotation.

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 ABSTRACTER: Roy C. Stevens

4.11 HIGHLY UNSATURATED FATTY ACIDS. III. ISOLATION OF METHYL EICOSAPENTAENOATE, ETHYL DECOSAPENTAENOATE, AND ETHYL DOCOSAHEXAENOATE FROM COD LIVER OIL ESTERS BY CHROMATOGRAPHY

Abu-Nasr, Ahmed M. and Holman, Ralph T.
Journal of the American Oil Chemists' Society 31, No. 2, 41-45 (February, 1954)

(a) Displacement chromatography using a charcoal-isopropanol-methyl behenate system has been successfully applied to the isolation of docosahexaenoic acid and ethyl docosahexaenoate from cod liver oil concentrates.

(b) Methyl eicosapentaenoate was isolated from cod liver oil methyl esters by combined elution chromatography on silicic acid and displacement chromatography.

(c) Using silicic acid as adsorbent and petroleum ether-chloroform as solvent, ethyl docosapentaenoate was isolated from cod liver oil ethyl esters.

(d) With a spinning band fractionation column it was found that fractional distillation of methyl esters of cod liver oil at 0.5 mm. Hg. resulted in increasing conjugation in the distillate as the fractionation proceeded. Fractional distillation is to be avoided as a final step in purification of polyunsaturated esters.

(e) The end absorption of conjugated pentaenoic acids is so large at the characteristic maximum for hexaene (3,750 Å) that simultaneous equations are required for the calculation of hexaenoic and pentaenoic acids.

(over)

 Author's summary

CAN WASHING MACHINE

NEW TUNA CANNING PROCESS

NEW SARDINE PROCESSING METHOD

HIGHLY UNSATURATED FATTY ACIDS

3.33 (Cross Reference: 1.1)

(4) The extracted fillets are carried through a 10-blade revolving knife, and the sections are then pushed one at a time onto a conveyor belt which carries them to the next step.

(5) The filling equipment consists of a six-pocket horizontal turret which is said to operate at the rate of 250 cans per minute.

Twenty-five people are required to operate the line, which is claimed to give 10 percent increased recovery per ton of tuna.

4.11

(f) Fifteen minutes of treatment with 21% KOH-ethylene glycol at 180° is not optimum for isomerization of ethyl docosapentaenoate from cod liver oil. The optimum isomerization times for hexaenoic acids of various sources are 4 to 6 minutes, considerably different from the 15 minutes established for arachidonate.

3.338

An important feature of this washer is that no mechanical parts are contained within the unit, thus simplifying maintenance.

The wash water contains a special-formula detergent which incorporates, among other chemicals, trisodium phosphate, a wetting agent, and an anti-foaming agent. Water is drawn from the bottoms of the sumps, while used water, falling back into the sumps, is drained off through a screen and into an overflow drain. The water is thus kept fresh and up to strength, in the washing section particularly.

The new unit has proved 100 percent effective in removing fish and soybean oil residues from cans. In addition, a single unit means less detergents and fewer workers in the can washing operations.

3.33 (Cross Reference: 1.2)

2.115 BEACH LANDING CRAFT USED FOR FISHING IN EUROPE

Zimmer, Hans K.
World Fishing 2, No. 11, 435-436 (November, 1953)

There are many cases where natural harbours do not exist, where the construction of harbours is too expensive and where water and current conditions make such construction virtually impossible. Fishing has therefore been carried out from open beaches in many places, quite large and efficient boats having been designed for this purpose, and such fisheries have often assumed great economic importance.

Many countries now in the process of developing their fisheries would benefit from studying the design of existing beach landing craft and the technique of their operation so that they can be used where feasible. In 1952, as a consultant to F.A.O., the author visited Denmark, Great Britain, the Netherlands, Portugal and Spain; this paper, based upon his findings in these countries, has been prepared with this end in view.

In Denmark, where the main beach fishing places are on the north-east coast of Jutland, the weather is rough, and normally there are not more than about 120 fishing days a year. With the change from sail to motor, the fishing craft became heavier, and mechanical means were evolved to assist in beaching and launching; the equipment and methods used are fully described and details of cost are given.

The boats are of strong clinker-built wood construction and typical craft, such as a 16 1/2 ft. rowing boat, a small open motor boat, and a larger motor boat with engine room aft and cabin forward, are described, together with details of construction.

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 Author's summary

2.3 AUTOMATIC MACHINE FORMS, CUTS AND BOXES FILLETS

Bunker, John
Maine Coast Fisherman 6, No. 7, 16 (February, 1954)

A Boston company now has a completely mechanized production line employing automatic filleting machines and a newly-developed forming machine which presses fillets into a one-pound one-piece unit at the same time it puts the fish into a box.

Fillets from the automatic cutting machines are mechanically dipped in brine for several seconds and then are placed on a conveyor which carries them to a funnel-shaped, transparent, plastic receptacle about 15 feet above the floor. Dropping into a tubular feeder, the fillets are compressed onto a revolving knife that slices off one-pound steaks of exactly uniform size and weight and places them in waxed cartons.

The cartons are wrapped in aluminum foil and then are quick-frozen for 45 minutes before being shipped or placed in cold storage.

According to the inventor, who is also president of the company, the forming machine does the work of 40 men at his plant. The hand process of placing fillets in a box, which entails hand-weighing to determine an even pound, is completely eliminated.

 ABSTRACTER: Roy C. Stevens

2.9 RESULTS OF DIALYZING SOME FISH POISONS

Halstead, Bruce W. and Ralls, R. J. (College of Medical Evangelists, Loma Linda, California)
Science 119, No. 3083, 160-161 (January 29, 1954)

Preliminary to more extensive work on the chemistry and pharmacology of poison from the moray eel, Gymnothorax, and from the snapper, Lutjanus, the authors prepared extracts and dialyzates from specimen material from 4 different species of Pacific Ocean fish. This material consisted of the following: (A) liver and (B) viscera (pooled liver, intestines, and gonads) from fresh-frozen Japanese puffer, Fugu rubripes chinensis, from Tokyo; (C) and (D) muscle from cooked moray eel, Gymnothorax sp. indet. from Kwajalein, Marshall Islands; (E) viscera from fresh and (F) viscera from fresh-frozen red snapper, Lutjanus vaigiensis, from Palmyra Island; and (G) liver and gonads from fresh-frozen Caranx melampygus, from Palmyra Island. The toxicity of these extracts and dialyzates was determined by injecting measured doses into live mice.

To prepare the extracts one part of tissue and two parts of water were (1) homogenized in a Waring blender and (2) centrifuged at 2000 r.p.m. for 25 minutes. Aliquots of the supernatant liquid or extract were dialyzed against sterilized distilled water in the cold (38-42° F.) for a minimum of 24 hours. The dialyzate was concentrated by distillation under low pressure and the volume adjusted to equal that of the original aliquot. The original extract, the concentrated extract, and the residue were each injected intraperitoneally in 1.0-ml. volumes into three separate groups of weanling mice of the California Caviary Strain No. 1, weight 15-23 grams. Symptoms were observed over a minimum of 36 hours.

Under the conditions of these experiments the data (table 1) show that the dialyzates had a measurable toxicity. The dose-response curve (not given) for these toxins shows a large increment

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 ABSTRACTER: Martin Heerdt

2.1129 BUOYANCY OF SUBMERGED CELLULAR PLASTIC NET FLOAT

Roach, S. W. and Harrison, J. S. M. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 97, 27-28 (December, 1953)

The authors were asked to test the suitability of a cellular plastic float for use on gill nets immersed at a depth of 70 fathoms. This float was 3 1/2 inches in diameter and 6 inches in length. It weighed 2.37 oz. and had a volume of 58.1 cubic inches.

The apparatus required to simulate a depth of 70 fathoms consisted of pressure chamber A, containing float B, and connecting reservoir C, with attached glass sight gauge D (see figure). This apparatus was entirely filled with water from the bottom, and all air was removed. Pressure for the test was supplied by a cylinder of compressed hydrogen gas E, through pressure-reducing valve F, connected by metal tubing to the top of reservoir C. By slowly opening the pressure-reducing valve on the cylinder of hydrogen and setting it at various pressures from 0 to 200 pounds per square inch (table, this card, over) the water in the apparatus was placed under an equivalent pressure. Placing the water under pressure compressed the plastic float in chamber A. By noting the fall of the water level in reservoir C, as indicated by the sight gage calibrated to measure this change, the buoyancy of the float was determined.

The data in the table shows that the float lost its buoyancy rapidly with each increase in the equivalent depth of the water in which it was submerged. This type of float would not be suitable at depths in excess of a few fathoms.

(over)

 ABSTRACTER: Martin Heerdt

BEACH LANDING CRAFT

DIALYZATION OF FISH POISONS

MECHANIZED FILLETING OPERATION

PLASTIC NET FLOAT

2.9

in response for a small increment in dosage. This indicates that a large fraction of the toxin is able to penetrate the dialyzing membrane; therefore, it may be inferred that the toxin molecule is small.

The apparent difference in percentage distribution of the toxin between dialyzate and residue (table 1) could be explained either as a function of concentration gradients or actual difference in molecular species.

TABLE 1. Dialysation results.*

Fish species	Sample	Original extract		Dialysate		Residue	
		Deaths no. inj.	Av. death time	Deaths no. inj.	Av. death time	Deaths no. inj.	Av. death time
Fugu rubripes chinensis	(1)	4/4	24 min	8/14	41 min	0/6	+
Fugu rubripes chinensis	(2)	4/4	3 min	30/32	4.7 min	19/34	15 hr
Gymnothorax sp. indet.	(1)	4/4	16 min	1/4	16 hr	0/4	+
Gymnothorax sp. indet.	(2)	4/4	24 hr	0/8	+++	4/8	24 hr
Lutjanus vaigiensis	(1)	21/43	24 hr	0/54	+	9/56	28 hr
Lutjanus vaigiensis	(2)	1/4	24 hr	0/12	++	0/12	+
Caranx melampygus		4/8	30 min	0/28	++	0/28	+

* Sublethal response recorded as: + occasional symptoms; ++ mild to acute symptoms in most mice; +++ entire group extremely distressed.

2.115

The principal beach fishing areas of England are on the east coast of Yorkshire, Northumberland, the Channel and south-east coast, and the types of craft described include the Yorkshire coble and the Hastings lugger.

The coble, it is noted, was designed to be launched from beaches against heavy breakers and to reach the open sea. This, and the practice of north-east coast fisherman of beaching their craft stern first, were responsible for the distinctive structural features of the coble. Both structure and design are discussed, and the method of launching and beaching described.

At present, almost no fishing is carried out by boats operated off the beaches of the Netherlands, but brief reference is made to the "Bomschuit" type used up to the end of the last century.

Contrary to the clinker-built hulls of the northern European countries, Portuguese beach craft are of carvel construction. A large variety of fishing boats is employed--from flat-bottomed 16 ft. "Chatas" to vessels of 17 tons gross--and propelled by oar, sail and engine.

In Spain, fishing from open beaches is carried out along the Mediterranean coast and the boats have oar, sail or engine propulsion. Even the small double-ended sailing boats are decked, and dimensions are generally about 18 ft. 9 in. by 7 ft. 3 in. by 1 ft. 6 in.

The Spanish method of beaching and launching is described, the way in which the beaching wire is secured being somewhat unusual.

Following this account of fishing craft, the author goes on to discuss the solution of specific beach problems by the various lifeboat institutions. Although the task of a lifeboat is different from that of a fishing vessel, the former's seaworthiness and seagoing qualities are desirable assets; experiments in lifeboat construction and beaching and launching techniques can also be of value to fishermen.

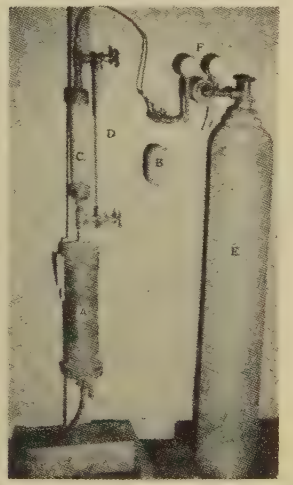
Finally, general problems of the mechanical propulsion of beach fishing craft, building materials and methods of construction, and beach problems affecting hull form are discussed.

(The above is the author's summary of a paper presented at the FAO-sponsored World Fishing Boat Congress, Paris, France and Miami, Florida, October, 1953.)

2.1129

The test showed, in addition, that the float did not absorb water under pressure, and that when the pressure was released the float rapidly regained its original shape, volume, and buoyancy.

Pressure, p.s.i. gauge	Equivalent depths, fathoms	Volume		Buoyancy	
		cubic inches	% of initial	ounces	% of initial
0	0	38.1	100	17.5	100
10	4	37.1	97.5	16.8	96.0
25	9	21.8	56.6	7.9	45.1
75	28	10.4	27.2	3.7	18.5
90	34	8.9	23.2	2.8	14.0
125	47	7.0	18.4	1.7	8.6
150	56	6.1	16.0	1.1	5.9
180	67	4.9	12.8	0.5	2.3
200	75	4.3	11.4	0.1	0.5



3.231 A VERTICAL PLATE FREEZER FOR WHOLE FISH

Yule, P. A. A. and Eddie, G. C. (Torry Research Station, Aberdeen, Scotland)
Modern Refrigeration 56, No. 669, 441-444 (December, 1953)

Developmental work has been carried out at Torry Station on the design and operation of a novel refrigeration unit for quick-freezing whole cod and herring in bulk. The resulting plant is presently being used on board the 90-ft. R. V. Keelby for freezing cod without wrappers in the form of large slabs 4 1/2 inches thick and 4 stones (56 pounds) in weight. With this freezer the time of thermal arrest (32° to 23° F.) is about 2 hours and the over-all time from 40° to -5° F. is 4 1/2 hours.

The new refrigeration unit was specifically designed to do the following: (1) freeze slabs of fish suitable for wholesale processing and distribution in natural form after thawing, (2) pass the fish through the freezing range 32° to 23° F. in 2 hours or less, (3) produce slabs of fish of a size that would reduce handling costs, (4) eliminate wrapping and packing, (5) require a minimum of space aboard the vessel.

The first model investigated was a simple "ice-mold" that produced a block of fish measuring 12 inches by 12 inches by 2 3/4 inches; the second model was an 11-inch by 11-inch plate freezer cooled by $CaCl_2$ brine; and the third model was a metal mold 36 inches long by 36 inches deep in which whole cod were frozen. Finally, the authors decided to proceed with the design of a simple freezer with movable vertical plates. This is the type of unit that eventually proved successful in tests conducted at sea.

The pilot scale freezer installed aboard the Keelby consists of one four-station vertical plate freezing unit (figure 2, this card, over) with a fixed center plate and 4 movable plates, 2 on each side.

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 ABSTRACTER: Martin Heerdt

3.33 SALT CONTENT OF SALMON CANNED FROM BRINE-FROZEN FISH

Miyauchi, D. T. and Heerdt, M. Jr.
Commercial Fisheries Review 16, No. 1, 8-10 (January, 1954)

Studies were made to determine how the amount of salt in brine-frozen salmon is affected by (1) the method of thawing and (2) the method of storing.

In the studies on the method of thawing, Bristol Bay red salmon (Oncorhynchus nerka) that were frozen in brine at about 5° F. and then held in dry storage were thawed as follows: (1) In running water. The salmon were placed in a barrel in which tap water was run in at the bottom at the rate of 4 gallons per minute and allowed to overflow at the top; thawing time, 4 hours. (2) In still water. The salmon were placed in a barrel and covered with tap water; thawing time, 12 hours. (3) In still air. The salmon were placed in a large wooden fish box; thawing time, 14 hours. After the brine-frozen salmon were thawed, they were canned in the same manner as fresh salmon, except that less salt was added.

After the cans had been in storage for several months, 6 or more cans were analyzed for salt content by the methods of analysis of the Association of Official Agricultural Chemists (1950). The results are as follows:

Method of Thawing	Amount of salt added per 1/2-pound can - Ounces	Salt content - average value - Percent
In running water	0.091	1.6
In still water	0.069	1.6
In still air	0.069	1.7
Control samples commercially packed from unfrozen fish	0.125	1.6

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 ABSTRACTER: D. T. Miyauchi

4.0 MARINE OILS: WITH PARTICULAR REFERENCE TO THOSE OF CANADA

Bailey, B. E. (Editor) (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Bulletin No. 89, 413 pp. (1952)

The table of contents lists 12 chapters. These are as follows:

1. General chemistry of marine oils and fats.
2. Nature of component fatty acids and composition of marine oils.
3. Vitamins, pigments, and other non-fat components of marine oils.
4. Metabolism of fats.
5. Chemical reactions and physical properties of fats and oils.
6. Deteriorative changes in marine oils.
7. Production of marine oils.
8. Refining and processing of marine oils.
9. Commercial utilization of marine oils in nutrition and in industry.
10. Properties of some Canadian marine oils.
11. Significance of analytical values.
12. Specification for marine oils of Australia, Belgium, Canada, Denmark, France, Germany, Great Britain, Japan, New Zealand, Norway, South Africa, Sweden, and United States of America.

Also included are 490 references.

3.238 PROTECTIVE PACKAGING OF FROZEN FOODS

Woodroof, J. G. and Rabak, William
Refrigerating Engineering 62, No. 2, 45-48 (February, 1954)

The quality of frozen food is greatly dependent upon its protection against "(a) moisture loss, which results in loss in weight and fresh appearance of the product; (b) exposure to air, which results in oxidation, rancidity, or change in color and flavor; (c) loss of volatile flavors; (d) enzymatic activity; and (e) loss of vitamins." Thus the soluble life of a frozen food is dependent upon the extent of the protection afforded it by packaging materials and method of packaging.

Some of the factors that influence permeability of materials and airtightness of packages at low temperature are (a) the nature and type of protective material; (b) the length of the storage period, because loss of moisture and flavor is usually in proportion to the length of storage; (c) humidity in the storage space; (d) velocity or amount of circulation of air in the storage space; and (e) method and type of seal (excluding all of the air possible from the package and making the seal as good as the packaging material).

The authors classify frozen food packaging and wrapping materials into the following 3 general types:

1. Nonrigid, impermeable or relatively impermeable bags, pouches, or wrappers; closed by dead fold, heat sealed, or ends twisted and tied; used in stockinet, as inner liner, or as overwrap for cartons; some may be vacuumized: (a) Aluminum foil--plain 0.0015 gage, or laminated 0.0003 or 0.0005 gage. Plain foil can be a highly efficient wrapping material for products of irregular shape. (b) Moisture- and water-resistant cellophane having applied on its surfaces lacquer coatings that produce a moisture- and water-resistant surface and provide a heat-sealing thermoplastic film. The "anchor" type cellophanes require the use of special water-resistant films and are used in wet packs, such as fruit in syrup. The sealing operation is critical; the best sealing temperatures generally lie

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 ABSTRACTER: D. T. Miyauchi

PLATE FREEZER FOR WHOLE FISH

REFERENCE ON MARINE OILS

SALT CONTENT OF BRINE FROZEN SALMON

PACKAGING MATERIALS

4.0 (Cross References: 6.133, 6.2)

3.238

between 285° and 385° F. (c) Polyethylene--plain 0.002 gage, or laminated 0.001 gage. It is easily fabricated, resistant to moisture-vapor and odors, semipermeable to oxygen, flexible at low temperatures, reusable, and relatively cheap. (d) Polyvinal chloride (Visten)--plain 0.002 gage or laminated 0.001 gage. (e) Polyvinylidene chloride (Saran)--plain 100 gage Type 517, or laminated 75 gage Type 517. It is most resistant to moisture, odor, or flavor transmission but is the most expensive and becomes quite brittle at low temperatures. (f) Rubber hydrochloride (Pliofilm)--120 HP or 100 HP. (g) Rubber latex (Cry-O-Vac)--0.002 gage. It can be heat shrunk to fit skin-tight around irregular materials. (h) Waxed (parafined)--25 # 500--glassine, paper or parchment. Its principal disadvantage is that it loses effectiveness when folded or handled roughly. (i) Laminations of the above with one another or with cotton, rayon, or nylon fabric; or with chip or kraft board.

2. Rigid, relatively impermeable widemouth cups, cartons, pans, or trays: (a) Waxed (parafined), round containers with slip-in or slip-over lids. (b) Waxed, rectangular, brick-shaped containers with set-up or telescope cartons. They may be used with a water-resistant bag liner that can be heat sealed and is usually overwrapped and heat sealed. (c) Rectangular cardboard containers with crimped metal ends. These containers can be filled and closed at high speed and are resistant to rough handling after freezing. (d) Waxed paperboard pans or trays.

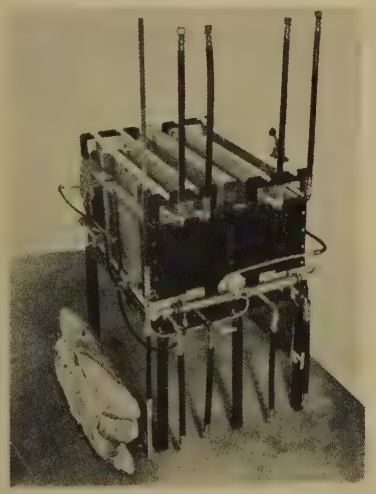
3. Rigid, impermeable containers: (a) Aluminum cans, trays, or pans with crimped, slip-in, or slip-over covers. Their chief disadvantage is the higher cost and ease of denting. (b) Glass jars, with wide mouth, straight or tapering sides, and screw or clamp-on covers. These are suitable for home freezing. (c) Polyethylene or other plastic cartons, jars, or trays with slip-in or slip-over covers. They are semifragile, high in initial cost but are reusable, and may have poorly fitting lids. (d) Tin cans with double seam, slip-in or slip-over covers; may be vacuumized. They are easily filled and closed, sanitary, and economical; the product can be rapidly frozen and thawed and is well protected. Their main disadvantage is that they are sometimes mistaken for and handled like canned goods. However, a recent patent overcomes this objection by utilizing one of the following:

(1) a combination opening and signaling device to indicate undue thawing, and
(2) an integral opening tab which is attached to the can body at the can factory.

3.231

Each of these plates is 36 inches long, 22 inches high and **4 1/2 inches thick. All of the movable** plates are freely suspended from pivot bars set in V-shaped slots cut in a frame above the unit. Stops are provided to limit the swing at the bottom of each plate to 1/2 inch. Hinged unloading doors are attached to the underside of the freezer.

Positive pressure is maintained on the plates with pneumatic air jacks so as to keep the plates in contact with the fish throughout the freezing operation. On completion of the freezing process the refrigerant cycle is reversed and hot gas is passed through the plates. At the same time the pneumatic jacks are reversed and the movable plates are pulled away from the frozen slab of fish. Two 7 1/2-h.p. water-cooled single-stage condensing units are used to operate the plate freezer.



3.33 (Cross References: 3.239, 1.30)

The data indicate that the amount of salt retained by red salmon brine-frozen at about 5° F. and then thawed in running water, still water, or still air is not excessive. It was found that the salt retained from brine-freezing can be compensated for by adding only 50 to 80 percent as much salt as is used with canned fresh salmon.

The salt content was determined on the canned product from brine-frozen chum salmon (Oncorhynchus keta) that had been stored in brine at 5° F. for approximately 2 weeks and then thawed in running water. The data indicate that less than 0.5 percent salt was carried over to the canned product and that this retained salt can be compensated for by decreasing the amount added during the canning process.

1.015 FISHERIES RESOURCES OF THAILAND

Anonymous
Commercial Fisheries Review 16, No. 1, 36-38 (January, 1954)

The marine, fresh, and brackish waters of Thailand are all reported to be very rich in many species of fish. The gulf of Thailand contains high concentrations of nutrient salts and is accordingly rich in plankton. This fact largely accounts for the productivity of the area. However, the aquatic resources of this country are only partially known, particularly those of the offshore waters of the Gulf.

Among the molluscs taken commercially from the Gulf are mussels, horse mussels, oysters, ark shells, scallops, squid, and a variety of clams. Some of these species occur in great abundance but are not used to any extent at present.

Thailand is also known for its great variety of crustaceans. At least 50 species of shrimp are already known and it is probable that many more will be discovered. In addition to the shrimp, there are several excellent species of crab. Spiny lobsters are taken in the lower Gulf and on the Indian Ocean coast. A large fresh-water prawn is caught in considerable numbers and has a ready market.

A considerable number of sharks, rays, and sawfishes occur in these waters, many of which are fished for commercially. Products from this group include fresh, salted, dried, and smoked meat, and dried shark fins. Large schools of plankton feeders such as the various members of the herring family and anchovies are taken seasonally. Members of the mackerel family occur in abundance seasonally and provide a large part of the present marine catch. These are usually sold fresh but may be salted, dried or cooked. Many species of the jack family (Carangidae) are found,

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 ABSTRACTER: Roy C. Stevens

1.5 BRITISH COLUMBIA LINGCOD

Anonymous
Trade News 6, No. 6, 6-7 (December, 1953)

The lingcod fishery of British Columbia has fluctuated rather widely over the past ten years, both from the standpoint of volume and of value. During the years 1944-46 the total marketed value of lingcod products exceeded one million dollars. The 1952 catch of 4,242,100 pounds had a marketed value of $590,000.

Lingcod is marketed whole and filleted, both fresh and frozen. The liver is a valuable byproduct of the fishery because of its high content of vitamin A. The other viscera are also high in vitamin A and add to the value of the fishery.

Lingcod are taken in the coastal waters of North America from California to Alaska. In British Columbia they occur in depths ranging from very shallow to more than 70 fathoms. They attain a weight of up to 70 pounds, and a maximum length between four and four and one-half feet. Males are much smaller than females and generally do not exceed a weight of 25 pounds.

Several types of gear are employed in the lingcod fishery. In order of importance these are: hand lines, trolls, trawls, long lines, and sunken gill nets. The most used method of fishing for lingcod is hand-lining or jigging with live bait. The small- or medium-sized vessels employed in this type of fishing are outfitted with live wells to hold herring for bait and also to keep the catches alive. Fish landed in the live state are held in floating live-boxes until time of sale. These fish command better prices than those handled in the usual way. Heavy sinkers weighing from two to five pounds are fastened to the ends of the main line and spreader bars of heavy wire or light rod

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 ABSTRACTER: Roy C. Stevens

2.01 SPOILAGE OF MACKERELS PRESERVED IN OIL

Venkataraman, R. and Sreenivasan, A.
Current Science 22, 309 (October, 1953)

While studying the preservation of mackerels in oil, we came across a type of spoilage similar to "sulfide stinker". Evolution of a stream of bubbles was noticed in less than 48 hours and within a week the fish disintegrated into a pulpy mass. Bacterial counts on sulfite agar were of the order of 106. Twenty-one colonies were isolated and restreaked on Brewer's agar in Fildes jar and the pure colonies examined.

Morphological features showed that all of them were small motile rods, clavate, with terminal spores typical of clostridia. The rods were single and in pairs with rounded ends. They all produced gas from cooked meat medium and Holman's medium and blackened the meat with partial digestion. Putrid smell was also noted but indole was not detected. Milk was coagulated but without 'stormy fermentation'. The bacteria belong to the genus Clostridium, which is known to be the agent for the spoilage of canned foods. The source is suspected to be the guts of mackerels and further investigation on this is continuing.

 Reprinted in whole

3.230 FISH STICKS

Anonymous
Food Engineering 26, No. 1, 44, 202-203 (January, 1954)

According to favorable retail marketing tests the breaded, deep-fat-fried, quick-frozen fish stick is a promising new food item that may bring about an increase in the sales of fish. The new pre-cooked fish sticks average 5/8 x 5/8 x 3 inches in size, weigh 1 ounce, and are packed 10 sticks to a retail size carton. In addition to having consumer convenience, portion control, and merchandising advantages, the new fish sticks require only 15 minutes of heating prior to serving. The homemaker is saved the customary effort of cleaning and cooking the fish, and there is no waste or objectionable odor to contend with.

Credit for the development of fish sticks belongs to one of the country's largest frozen food processors who introduced them about one year ago after three years of experimentation. The new product is a boon to retailers because it is a rapid-turn-over item that can be self-serviced in freezer-type display cases. Fish sticks also show promise of becoming an institutional trade item, for at least one fish processor is now packing a 9-pound carton containing 36 4-ounce portions.

Currently the only operations that can be performed continuously on a straight line basis are battering, breading, deep-fat frying, and cooling. What is most needed now is a continuous method of forming, cutting, and freezing the fish sticks. Most processors handle these operations by freeze-molding the fish fillets into blocks that are cut into sticks with a band saw. The cut sticks are either held in freezer storage or moved directly into the breading-frying department. Here the sticks are swished around in an all-purpose egg batter, drained on wire-mesh trays, and then dropped into a breading mixture.

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 ABSTRACTER: Martin Heerdt

FISHERY RESOURCES OF THAILAND

SPOILAGE OF MACKEREL IN OIL

BRITISH COLUMBIA LINGCOD

FISH STICKS

2.01 (Cross Reference: 1.1)

3.230

After having been breaded, the sticks are placed on wire mesh trays and immersed in 375° F. shortening, fried for 2 1/2 minutes, removed from the cooking fat, and drained for 2 minutes. After 5 minutes of cooling in a cabinet the trayed sticks are packed 10 to a cellophane or grease-proof glassine-lined carton, checkweighed, loaded onto freezer trays, and quick frozen. As soon as the fish sticks are frozen the cartons are removed from the freezer, machine overwrapped with printed waxed paper, cased, and either put into storage or moved into market channels.

1.015

including the cavallas, crevalles, hard-tail jacks, pampanos, scads, and leather jacks. Many of these are caught in quantity and are sold fresh or salted and dried. The pomfrets, closely related to the jacks, are one of the most valued species caught in Thai waters.

Among the species that live at or near the bottom are the groupers. These probably occur in greater numbers than is reflected by the present catches. Many species of snappers are taken and they are highly esteemed as food fishes. Other groups found are the breams, porgies, drums, sea bass and grunts. Among the flat fishes occurring in these waters are the tongue fishes, flukes, and flounders; little is known of their abundance or distribution.

Other species of commercial importance are the sea catfishes, barracudas, and threadfins, representatives of which often provide large catches. Mullets and goat fishes are taken in some quantity.

Very little is actually known of the aquatic resources of the marine areas of Thailand. Many new species will undoubtedly be found during exploratory work and the geographic range of forms now known from other areas will be extended to Thailand.

1.5 (Cross Reference: 1.0111

are secured a short distance above. The live herring on hooks are attached to short lines on the ends of the spreader bars. The bait is usually fished from three to six feet off the bottom.

While lingcod are often taken incidental to trolling and trawling operations for other species, these methods have both been adapted to fishing directly for lingcod.

Where competition for food is keen, lingcod are often taken on long line gear set for halibut or dogfish.

6.71 A STUDY OF THE PROTEOLYTIC ENZYME ACTIVITY OF THE PYLORIA CAECA OF REDFISH

Stern, Joseph A. and Lockhart, Ernest E. (Massachusetts Institute of Technology, Cambridge)
Journal of the Fisheries Research Board of Canada 10, No. 8, 590-598 (November, 1953)

The use of the pyloric caeca from the waste portion of various species of fish as a source of enzymes in leather-bate preparations has shown considerable promise in recent investigations. Since redfish (Sebastes marinus) is landed in volume at New England ports throughout the year, it has been proposed as a good source of pyloric caeca for commercial leather-bate preparations. This paper evaluates the pyloric caeca as a source of proteolytic enzymes by comparison with a commercial bate and various other enzyme preparations.

Redfish that had been 14 days in ice were used as a source of raw material. The pyloric caeca were recovered from the fillet waste from these redfish and frozen with "dry ice". Thirty-six and one-half grams of dried extract was prepared from the frozen caeca from 16 kilograms of redfish fillet waste by the method of Johnston (1941). To prepare an enzyme solution, 1.00 gram of the dried extract was shaken vigorously for 1 minute in 100.0 ml. of distilled water. The resulting suspension was allowed to stand at 40° F. (4.4° C.) until equilibrium had been established, or about 6 hours. A casein substrate was used for the evaluation of bates. This substrate was prepared by dissolving 2.5 grams of casein in 100.0 ml. of appropriate phosphate buffer solution or 0.50 gram of casein in 30.0 ml. of appropriate borate buffer solution.

The general procedure used in studying the influence of temperature and pH on enzymatic activity and in comparing the proteolytic activity of redfish caecal extract with other enzyme preparations was as follows: Five-ml. quantities of clear supernatant liquid from the caecal extract preparation, the commercial bate, or the other enzyme preparations were added to separate digestion vessels each

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 ABSTRACTER: Martin Heerdt

7.81 THE DETERMINATION OF VOLATILE REDUCING SUBSTANCES (V.R.S.) AS AN AID IN QUALITY CONTROL OF FISH PRODUCTS

Farber, Lionel and Cederquist, Anne
Food Technology 7, No. 12, 478-480 (December, 1953)

The determination of volatile reducing substances (V.R.S.) in fish products can be effectively employed to distinguish between acceptable and not acceptable products and to compare a commodity with an ideal standard. Volatile reducing substance values have been tabulated with the organoleptic conditions and volatile nitrogen content to illustrate possible applications of the method.

TABLE 1
Volatile reducing substances and nitrogen compounds in ground raw rock cod

Organoleptic condition	V. R. S. micro-equivalents reduction per 5 ml. press juice	Volatile nitrogen per 100 ml. press juice: Total	Volatile nitrogen per 100 ml. press juice: Trimethylamine
Fairly fresh, passable odor	16.0	5.5	0
Sickening sweet off odor, not passable	53.4	20.2	4.8

TABLE 2
Volatile reducing substances and nitrogen compounds in frozen Dover sole fillets

Organoleptic condition	V. R. S. Range	V. R. S. Average	mg. volatile nitrogen per 100 ml. Total	mg. volatile nitrogen per 100 ml. Trimethylamine
Generally passable, none with off odor	4.0- 4.2	4.1	3.4	0
Generally fairly passable, some fillets wih slight off odor	9.3-19.0	15.2	11.0	3.1
Mixed fillets, some passable and some with off odors	13.9-22.6	18.2	12.4	4.5
Mixed fillets, some passable and many with definite off odors	11.8-32.7	21.3	19.0	8.0
Definite off odors, not passable	29.6-53.8	39.4	29.2	18.8

(over)

 ABSTRACTER: George Pigott

1.81 STUDY BEING MADE OF HOW TO OBTAIN MAXIMUM YIELD FROM PLANTED OYSTERS

Anonymous
Atlantic Fisherman 35, No. 1, 17 (February, 1954)

The Virginia Fisheries Laboratory at Gloucester Point is conducting research that may help the oyster planters of lower Chesapeake Bay increase their yields of oysters. Experiments with oysters in trays have shown that growth exceeds mortality through the first year and until early summer of the second year. From that time on, more weight is lost by death of oysters than is gained by growth of survivors. It would appear from these experiments that in order to obtain the greatest yield in bushels, oysters should be harvested about 18 months after planting.

However, it is pointed out that the investigations are still in the preliminary stage and that there are many other factors that must be considered in determining the best time to harvest. Oysters will reach a marketable size in 18 months only on grounds where growth is good. A high yield in bushels will not benefit the planter if the oysters are too small to market. The condition and flavor of the oysters at the time of greatest yield are also important.

Charts have been prepared at the Laboratory showing the size of oysters and the yield in bushels at various rates of growth and death. To use these charts to advantage, the oysterman must determine the growth and death rates characteristic of each of his grounds. Then, by selecting the chart that fits the local conditions best, he can decide when to harvest for the maximum commercial yield.

(over)

 ABSTRACTER: Roy C. Stevens

8.66 BIOLOGICAL METHOD OF DETERMINATION AND THE RESULTS OF EVALUATION OF FISH FATS AND OTHER PRODUCTS OF MARINE COMMERCE IN RESPECT TO VITAMIN D

Bukin, V. N. and Erofeeva, N. N.
Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik 1, 350-365 (1951)
Chemical Abstracts 47, No. 11, 5630 (1953)

Some sea fish have moderate deposits of vitamin D. The highest is found in the fat obtained by mild alk. hydrolysis of whale liver (700 I.U./g.), in the fat from the internal organs of Cyprinus carpio and Abramis brama (both about 325 I.U./g.), and subcutaneous dolphin fat (108-165 I.U.). Cod liver showed 70-216 I.U./g. Many of the fish are devoid of the vitamin. Mild alkaline hydrolysis is most satisfactory for isolation from the body fats. Irradiation of the fats lacking vitamin D, but containing the provitamins, results in high levels of activity (up to 16,000-32,000 I.U./g.).

 Reprinted in whole

ENZYME ACTIVITY OF PYLORIC CAECA

YIELDS FROM PLANTED OYSTERS

QUALITY CONTROL

VITAMIN D IN FISH

1.81

General practice in Chesapeake Bay is to leave planted oysters on the grounds for about three years before harvesting. During this time approximately 75 percent of the oysters in the original planting die. A yield of about one bushel of market oysters for each bushel of seed is thus produced. If these high losses, characteristic of the salty waters of the lower part of Chesapeake Bay, can be avoided, it will be a great boon to the planters of this area.

6.71 (Cross References: 0.38, 1.4)

containing 7.50 ml. of casein solution at the desired pH in the range 7.0 to 11.4. These mixtures were held at a given temperature in the range 25°C. to 60° ± 1°C. for from 0 to 60 minutes, depending upon the desired object of the experiment. At the end of this time, 2.00-ml. aliquots were transferred from the digestion flasks to 15-ml. centrifuge tubes, each containing 6.0 ml. of 10 percent trichloracetic acid solution. The aliquots were then carried through the procedure described below for the measurement of enzyme activity.

The degree of activity of the enzyme preparations was measured by colorimetrically determining the undigested protein material at the end of the digestion by a modification of the method of Robinson and Hogden (1940), and Kingsley (1939, 1940) for the determination of serum total protein by the biuret reaction.

With casein as a substrate, the optimum temperature for proteolytic activity was found to be 51°-52°C., and the optimum hydrogen-ion concentration for proteolytic activity at 50°C. was found to be pH 8.75, or slightly higher than the optimum pH of trypsin.

The proteolytic activity of the redfish caeca preparation also was compared with the proteolytic activities of other enzyme preparations. Data from this experiment are shown in figure 4. If the activity of trypsin is taken arbitrarily as 100, the relative activities of the other preparations are as follows: pancreatin 95, dried redfish caeca 77, papain 32, commercial bate 13, and hog intestinal mucosa 10. Accordingly, redfish pyloric caeca are a potential source of commercial leather bate.

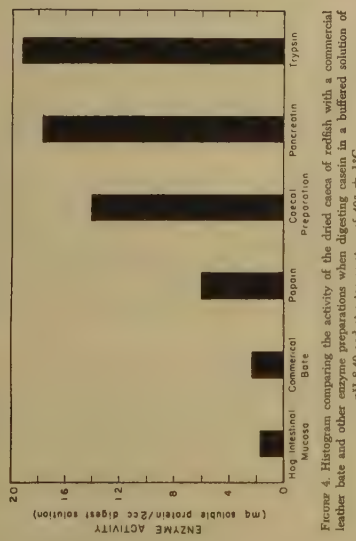

FIGURE 4. Histogram comparing the activity of the dried caeca of redfish with a commercial leather bate and other enzyme preparations when digesting casein in a buffered solution of pH 8.40 and at a temperature of 40° ± 1°C.

7.81

TABLE 3

Volatile reducing substances in chum salmon canned after progressive raw storage in the round at 65° F. (18.3° C.) average temp.

Hours old	Organoleptic judgment	Volatile reducing substance	
		Range	Average
7	Normal odor and color	14.0- 15.3	14.6
31	Slightly soft and pink, somewhat stronger odor	27.0- 30.9	28.6
55	Somewhat soft, definite pink color and strong odor, stale	31.8- 35.9	34.3
77	Soft, pink to red color, spoiled odor, taint	51.5- 61.9	57.2
99	Honeycomb present, very strong spoiled odor, putrid	97.4-136.0	120.8

TABLE 4

Volatile reducing substances and nitrogen compounds in canned fish

Product	Organoleptic condition	V. R. S. Average	mg volatile nitrogen per 100 ml.	
			Total	Trimethylamine
Calif. sardines in tomato sauce	Passable	23.7	44.3	6.5
	Not passable	61.4	33.7	2.8
Calif. anchovies in tomato sauce	Passable	31.6	58.2	19.3
	Not passable	43.3	58.5	18.7

TABLE 5

Volatile reducing substances in canned tuna of various species

Species	Volatile reducing substances in		
	Solid	Pieces	Grated[b]
Albacore	8.7	10.7	14.6
	10.3	12.8	16.5
	7.5	15.0	19.9
	7.6	16.3	14.8
	15.4	15.8	
	8.9		18.8
	8.4		14.5
Yellowfin	8.8	9.7	11.4
	12.1	12.4	11.7
	15.4	15.3	14.8
	12.2		16.7
Skipjack		12.5	16.1
		8.4	19.7
		17.5	16.9
Bluefin	8.4	10.5	14.5
	14.7		15.1

[b] In general the grated samples (and pieces to a lesser extent) with the highest V. R. S. values had the strongest odors, mostly suggesting fat oxidative changes. However, this correlation was not consistent, since some cans with no marked odors had high V. R. S. values.

TABLE 6

Volatile reducing substances in various species of canned tuna

Cannery number	Average V. R. S. in		
	Albacore	Yellowfin	Skipjack
1	7.5	13.5	17.2
2	11.3	6.5	19.3
3	14.7	15.2	17.4
4	11.9	10.0	10.5
5A	12.7	11.8	10.6
5B	12.5	15.0	
6A	11.3	10.9	19.2
6B	13.2	11.3	14.1
6C	9.5	12.1	16.8

0.117 A THREE-STAGE MOLECULAR STILL

Sutton, Donald A.
Chemistry & Industry, No. 52, 1383 (December 26, 1953)

0.12 STOPS FIRES BEFORE THEY START

DeVaux, Frank
Food Engineering 25, No. 9, 77 (September, 1953)

Constantly scanning smokehouse temperatures, a central electronic recorder actuates a signal light and alarm bell whenever heat in any house becomes critical.

0.38 FUNCTIONAL GROUP OF COENZYME A AND ITS METABOLIC RELATIONS, ESPECIALLY IN THE FATTY ACID CYCLE

Lynen, F.
Federation Proceedings 12, No. 3, 683 (September, 1953)

0.38 A STUDY OF THE PROTEOLYTIC ENZYME ACTIVITY OF THE PYLORIC CAECA OF REDFISH

Stern, Joseph A. and Lockhart, Ernest F
Journal of the Fisheries Research Board of Canada 10, No. 8, 590-598 (November, 1953)

(Abstract of this article appears under 6.71 page 19)

0.6 ESTIMATION OF STERILIZING VALUES OF PROCESSES AS APPLIED TO CANNED FOODS. II. PACKS HEATING BY CONDUCTION:COMPLEX PROCESSING CONDITIONS AND VALUE OF COMING UP TIME OF RETORT

Gillespy, T. G.
Journal of the Science of Food and Agriculture 4, No. 12, 553-565 (December, 1953)

(Abstract of this article appears under 3.33 page 19 - March 1954 issue)

0.6 ANNUAL REPORT OF THE FISHERIES RESEARCH BOARD OF CANADA, 1952

Reed, G. B. and Dymond, J. R.
Annual Report of the Fisheries Research Board of Canada for the Year 1952, 231 pp.

(Abstract of this article appears under 1.0111 page 19 - February, 1954 issue)

0.7 EVIDENCE PRESENTED FOR NEW GROWTH FACTOR

Anonymous
Journal of Agricultural and Food Chemistry 1, No. 17, 1031 (November 11, 1953)

1.1 SPOILAGE OF MACKERELS PRESERVED IN OIL

Venkataraman, R. and Sreenivasan, A.
Current Science 22, 309 (October, 1953)

(Abstract of this article appears under 2.01 page 17)

1.1 "ECONOMY" TUNA PACKING PROCESS IS UNVEILED

Anonymous
Pacific Fisherman 52, No. 3, 63 (February, 1954)

(Abstract of this article appears under 3.33 page 11)

1.1 THE AMERICAN TUNA INDUSTRY...PAST, PRESENT, FUTURE

Morris, E. L.
Pan American Fisherman 8, No. 5, 16-17, 24, 27 (December, 1953)

1.1 HOW TUNA TAGGING IS DONE--AND HOW IT HELPS SCIENCE

Anonymous
Pacific Fisherman 52, No. 1, 12 (January, 1954)

1.0111 BRITISH COLUMBIA LINGCOD

Anonymous
Trade News 6, No. 6, 6 (December, 1953)

(Abstract of this article appears under 1.5 page 17)

1.2 NEW METHOD OF SARDINE PROCESSING INTRODUCED IN MAINE CANNERY

Anonymous
Fishing Gazette 71, No. 1, 50 (January, 1954)

(Abstract of this article appears under 3.33 page 11)

1.2 SOUTHEASTERN ALASKA EXPLORATORY HERRING FISHING OPERATIONS, WINTER 1952/53

Kolloen, Lawrence N. and Smith, Keith A.
Commercial Fisheries Review 15, No. 11, 1-24 (November, 1953)

(Abstract of this article appears under 2.12 page 17 - February 1954 issue)

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Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemistry and Industry
Commercial Fisheries Review
Commercial Fisherman
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fisherman
Fishermen's News
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Foreign Commerce Weekly
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

1.30 SALT CONTENT OF SALMON CANNED FROM BRINE-FROZEN FISH

Miyauchi, D. T. and Heerdt, M. Jr.
Commercial Fisheries Review 16, No. 1, 8-10 (January, 1954)

(Abstract of this article appears under 3.33 page 15)

1.37 TROUT FISHING IN MICHIGAN WATERS OF LAKE SUPERIOR, 1952

Hile, Ralph (FWS)
Fisherman 21, No. 6, 7, 11-12, 14, Fall Issue, 1953

1.4 A STUDY OF THE PROTEOLYTIC ENZYME ACTIVITY OF THE PYLORIC CAECA OF REDFISH

Stern, Joseph A. and Lockhart, Ernest F.
Journal of the Fisheries Research Board of Canada 10, No. 8, 590-598 (November, 1953)

(Abstract of this article appears under 6.71 page 19)

1.5 NEW METHOD OF CURING SALT CODFISH

Anonymous
Canadian Fisherman 34, No. 11, 32 (November, 1953)

(Abstract of this article appears under 3.5 page 15 - February 1954 issue)

1.86 STUDIES ON THE MANUFACTURE OF CANNED CRAB

Tanikawa, Eiichi
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 1 (May, 1953)

I. ON THE MANUFACTURE OF CANNED CRAB FROM ERIMACRUS ISENBECKII (BRANDT)
Tanikawa, Eiichi; Akiba, Minoru; and Kimura, Morihisa

II. VELOCITY OF BACTERIAL DECOMPOSITION OF THE MEAT OF ERIMACRUS ISENBECKII
Tanikawa, Eiichi; Akiba, Minoru; and Motohiro, Terushige

III. DISCUSSION OF METHODS FOR DETERMINING THE FRESHNESS OF MEAT OF ERIMACRUS ISENBECKII
Tanikawa, Eiichi; Akiba, Minoru; and Motohiro, Terushige

IV. STUDIES ON THE INFLUENCES OF THE FRESHNESS OF RAW CRAB MEAT AND DURATION OF STORAGE AFTER BOILING UPON THE QUALITY OF CANNED CRAB MEAT
Tanikawa, Eiichi; Inoue, Yasunosuke; and Akiba, Minoru

1.95 THE COMPONENT ACIDS OF MILK FATS OF BALAENOPTERA PHYSALUS (FINNER WHALE)

Cama, J. S. and Meara, M. L.
Biochemical Journal 55, No. 2, 365-367 (September, 1953)

Finner-whale (Balaenoptera physalus) milk has a fat content approximately 10 times greater than that of the milk of land animals.

1.95 WHALE-MARKING EXPEDITION

Anonymous
World Fishing 2, No. 12, 497 (December, 1953)

1.95 LIVER OF WHALES AS RAW MATERIAL FOR PRODUCTION OF VITAMIN A

Bukin, V. N. and Skorobogatova, E. P.
Akad. Nauk. S.S.S.R., Inst. Biokhim. im. A. N. Bakha, Vitaminnye Resursy i Ispol'zovanie, Sbornik, 207-215 (1951)
Chemical Abstracts 47, No. 11, 5630 (1953)

(Abstract of this article appears under 8.6179 page 7)

2.01 STUDIES ON THE BACTERIAL ENZYMES. 2. ON THE CATALASE OF MICROCOCCUS LYSODEIKTICUS (PART I)

Nagao, Kiyoshi
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 1, 108-111 (May, 1953)

"Catalase solution was obtained by the addition of lysozyme from Micrococcus lysodeikticus. The optimum pH and temperature of catalase activity was pH 7.5 and 32° C."

2.01 BACTERIOLOGICAL STUDIES OF SHIOKARA OR "SOUSED SQUID". 5. ON THE PROTEOLYTIC ENZYMES OF BACTERIA. (PART I). SOME PROPERTIES OF THE PROTEOLYTIC ENZYME OF BACILLUS SUBTILIS. 6. ON THE PROTEOLYTIC ENZYMES OF BACTERIA. (PART II). ON THE ACTIVATOR OF THE PROTEOLYTIC ENZYME OF BACILLUS SUBTILIS.

Nago, Kiyoshi
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 1, 96-107 (May, 1953)

"The enzyme showed optimal activity at pH of 6.8 to 7.2 and temperature of 40° C. and was activated by either Mn^{++}, or cysteine."

2.01 A PRELIMINARY INVESTIGATION OF THE BACTERIAL FLORA OF THE MACKERELS OF THE WEST COAST

Venkataraman, R. and Sreenivasan, A.
Indian Journal of Medical Research 40, No. 4, 529-533 (October, 1952)

(Abstract of this article appears under 0.5 page 9 - March 1954 issue)

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3.231 FREEZING FISH AT SEA--NEW ENGLAND. PART 7--PICTORIAL STORY OF OPERATIONS AT SEA AND ASHORE

Anonymous
Commercial Fisheries Review 15, No. 12, 1-12 (December, 1953)

(Abstract of this article appears under 3.234 page 19 - March 1954 issue)

3.231 CHEMICAL PROPERTIES OF REFRIGERANTS WITH PARTICULAR REFERENCE TO THEIR BEHAVIOUR IN REFRIGERATION PLANTS

Bews, W. F.
Modern Refrigeration 56, No. 668, 419 (November, 1953)

3.231 MOISTURE IN REFRIGERATING MACHINERY CIRCUITS AND COMPONENTS. IV. INERT GAS SYSTEMS

Ranken, M. B.
Modern Refrigeration 56, No. 666, 338 (September, 1953)

3.238 NEW FROZEN FOOD CONTAINER

Anonymous
Canner 118, No. 4, 16 (January 25, 1954)

A new refrigerated and frozen food container is being introduced to the trade via an aluminum trailer outfitted with a packaging machine for demonstration purposes. The container consists of an aluminum foil tray with a board cover which may be plain or foil-laminated, and a foil-laminated overwrap. According to company claims, the combination of an aluminum tray and foil-laminated overwrap provides excellent protection against dehydration and reduces freezing time up to 30 percent.

3.239 SALT CONTENT OF SALMON CANNED FROM BRINE-FROZEN FISH

Miyauchi, D. T. and Heerdt, M. Jr.
Commercial Fisheries Review 16, No. 1, 8-10 (January, 1954)

(Abstract of this article appears under 3.33 page 15)

3.249 DETERMINATION OF LACTIC ACID IN FISH MUSCLE

Locke, Richard M.
Thesis: Northeastern University, Boston (1935)

(Abstract of this article appears under 2.02 page 3 - January 1954 issue)

4.4 SOME OBSERVATIONS ON STORED HERRING OIL

Arefjord, M.
Meld. fra SSR,. No. 8, 178 (December, 1953)

The analysis of 5 samples of herring oil before and after 3 years' storage indicates marked correlation between the sludge content and the increase of free fatty acids.

4.64 ANTIOXIDANTS. NEW DEVELOPMENTS FOR FOOD USE

Kraybill, H. R. and Dugan, L. R. Jr.
Journal of Agricultural and Food Chemistry 2, No. 2, 81 (January 20, 1954)

Sixty-seven references are cited.

4.64 THE STABILIZATION OF ANIMAL FATS WITH ANTIOXIDANTS DURING RENDERING

Dugan, L. R. Jr.; Marx, Lotte; Ostby, Paul; and Wilder, O.H.M.
Journal of the American Oil Chemists' Society 31, No. 2, 46-49 (February, 1954)

6.3 THERMAL DECOMPOSITION OF ALGINS AS DETERMINED BY THERMO-BALANCE METHOD

Kato, Kenji
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 1, 40-42 (May, 1953)

"The algin began to decompose suddenly at a temperature in the range of 186°-231.5°C."

6.3 CHEMICAL STUDIES ON MARINE ALGAE. VII. TYROSINE AND TRYPTOPHANE CONTENTS IN VARIOUS SPECIES OF MARINE ALGAE

Takagi, Mitsuzo
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 1, 86-91 (May, 1953)

"The proportion of tyrosine content to crude protein was estimated as from 0.95 to 1.74% in green algae, 1.58 to 5.70% in brown algae, and 1.48 to 4.75% in red algae. The proportion of tryptophane content to crude protein was estimated as from 0.41 to 2.50% in green algae, 0.94 to 8.75% in brown algae, and 0.54 to 2.35% in red algae."

6.3 ANIMAL PROTEIN FACTOR (APF) AND VITAMIN B_{12} IN MARINE PRODUCTS. II. SEAWEEDS

Hashimoto, Yoshiro and Maeda, Yasuhiko
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 3, 141 (1953) (English summary, figure, and tables)

The vitamin B_{12} content of 1 green, 12 brown, and 3 red marine algae is tabulated.

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